

CLAIMS:

1. In an optoelectronic timing system, a method for operating a continuous wave semiconductor laser in a pulsed

5 output mode, the method comprising:

determining a characteristic input voltage amplitude for continuous wave light emission for the continuous wave laser;

10 determining a characteristic input current threshold for continuous wave light emission for the continuous wave laser;

defining an input pulse to the continuous wave laser, the input pulse characterized by a power metric at least one order of magnitude greater than a power metric defined
15 by the combination of the characteristic input voltage amplitude and characteristic input current threshold; and

providing the input pulse to the continuous wave laser, the pulse having a pulse width no greater than 1 nanosecond and a duty cycle no greater than 25 %.

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2. The method according to claim 1, further comprising:

establishing a current level for the input pulse, the current level being at least one order of magnitude greater than the characteristic input current threshold for

25 continuous wave light emission; and

sweeping an input voltage amplitude, the input voltage amplitude having an initial value at least as great as the characteristic input voltage amplitude for continuous wave light emission.

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3. The method according to claim 2, further comprising:

continuing the sweeping step until the continuous wave laser exhibits an output pulse having an output voltage amplitude discontinuity characteristic, the discontinuity defining an output voltage amplitude at least 200% greater
5 than a nominal output voltage characteristic for continuous wave emission; and

defining the output voltage amplitude discontinuity as an input pulse power threshold value.

10 4. The method according to claim 3, further comprising:
continuing the sweeping step beyond the input pulse power threshold value;

identifying a maximum value in the output pulse amplitude as a function of input pulse amplitude; and

15 operating the continuous wave laser in a high output power pulse mode with an input pulse having amplitude characteristics between the threshold value and the value required to give the maximum value in the output pulse amplitude.

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5. The method according to claim 4, wherein the continuous wave laser is fabricated from materials selected from the group consisting of AlGaInP, GaAlAs, AlGaAs, InGaAsP, InGaP/GaAs, (Al)InGaAs(N)/GaAs, (Al)InGaAsSb,
25 InAsPSb, GaN and ZnSe.

6. The method according to claim 4, wherein the continuous wave laser is adapted to emit light at wavelengths from about 650 nanometers to about 1700
30 nanometers.

7. The method according to claim 4, wherein the input pulse power threshold value is at least 2.0 Watts.

8. The method according to claim 7, wherein the input pulse power threshold value is between about 2.0 Watts and about 6.5 Watts.

9. In an optoelectronic timing system, a continuous wave semiconductor laser operating in a pulsed output mode, the system comprising:

a continuous wave laser including a characteristic input voltage amplitude for continuous wave light emission, the laser further including a characteristic input current threshold for continuous wave light emission;

an input pulse coupled to the continuous wave laser, the input pulse characterized by a power metric at least one order of magnitude greater than a power metric defined by the combination of the characteristic input voltage amplitude and characteristic input current threshold; and

the pulse having a pulse width no greater than 1 nanosecond and a duty cycle no greater than 25 %.

10. The system according to claim 9, further comprising:

means for establishing a current level for the input pulse, the current level being at least one order of magnitude greater than the characteristic input current threshold for continuous wave light emission; and

means for sweeping an input voltage amplitude, the input voltage amplitude having an initial value at least as great as the characteristic input voltage amplitude for continuous wave light emission.

11. The system according to claim 10, further comprising an output pulse having an output voltage amplitude discontinuity characteristic, the discontinuity defining an output voltage amplitude at least 200% greater than a nominal output voltage characteristic for continuous wave emission, the output voltage amplitude discontinuity defining an input pulse power threshold value.

12. The method according to claim 11, wherein output pulse amplitude plotted as a function of input pulse amplitude defines a maximum value, the continuous wave laser being operated in a high output power pulse mode with an input pulse having amplitude characteristics between the threshold value and the value required to give the maximum value in the output pulse amplitude.

13. The system according to claim 12, wherein the continuous wave laser is fabricated from materials selected from the group consisting of AlGaInP, GaAlAs, AlGaAs, InGaAsP, InGaP/GaAs, (Al)InGaAs(N)/GaAs, (Al)InGaAsSb, InAsPSb, GaN and ZnSe.

14. The system according to claim 12, wherein the continuous wave laser is adapted to emit light at wavelengths from about 650 nanometers to about 1700 nanometers.

15. The system according to claim 12, wherein the input pulse power threshold value is at least 2.0 Watts.

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16. The system according to claim 12, wherein the input pulse power threshold value is between about 2.0 Watts and about 6.5 Watts.

5 17. In an optoelectronic timing system, a method for operating a continuous wave semiconductor laser operating in a pulsed output mode, the method comprising:

identifying a characteristic input voltage amplitude and a characteristic input current threshold for continuous wave light emission; and

10 applying an input pulse to the continuous wave laser, the input pulse characterized by a power metric at least one order of magnitude greater than a power metric defined by the combination of the characteristic input voltage amplitude and characteristic input current threshold.

18. The method according to claim 17, wherein an output pulse amplitude plotted as a function of input pulse amplitude defines a maximum value, the continuous wave laser being operated in a high output power pulse mode with an input pulse having amplitude characteristics between the threshold value and the value required to give the maximum value in the output pulse amplitude.

25 19. The method according to claim 18, wherein the input pulse power threshold value is at least 2.0 Watts.

20. The method according to claim 19, wherein the input pulse power threshold value is between about 2.0 Watts and about 6.5 Watts, and wherein the input pulse has a pulse width no greater than 1 nanosecond at a duty cycle no greater than 25%.